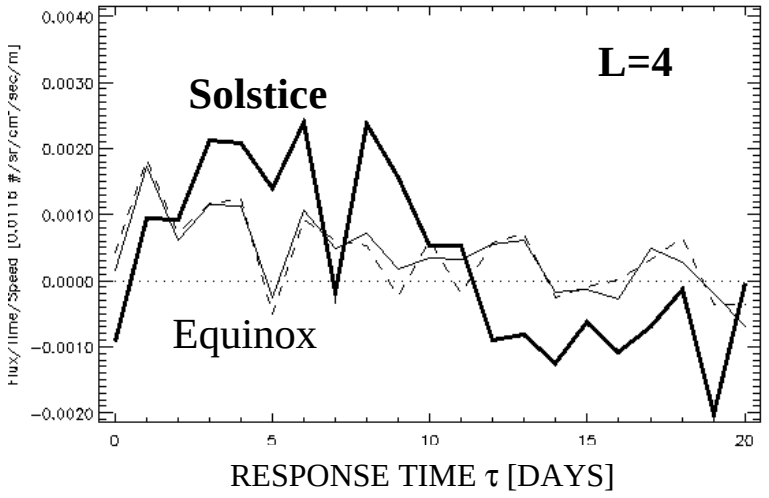
Laboratory for Extraterrestrial Physics
Code 692 - D. Vassiliadis, A. J. Klimas

Space Weather Physics:

The Sudden and Prolonged Depletion of Energetic Electrons in the Outer Zone, May-July 1999

• Radiation belt energetic electrons cause cumulative degradation in spacecraft performance.
• Normally electron acceleration follows increases in solar wind speed V_{SW}.
• But: after a brief solar wind *density* depletion on May 11, 1999, the electron flux decreased by 10^2 and remained low for >2 months, even though the solar wind speed continued to vary in its normal range.
• A clue to magnetospheric particle acceleration?
• Measure response of electrons* using linear filters H(L;t):

SEASONAL VARIATION IN ELECTRON RESPONSE H(L;t)



• Results:

1) Seasonal effect in electron response in a normal year (diagram above).
2) New acceleration pattern and dynamics during May-July 1999 event (next page).
3) Simultaneously: large *radial* contraction of the electron zone (not shown).

* Electrons measured by SAMPEX/PET (2-6 MeV)
Solar wind speed measured by ACE/SWEPAM

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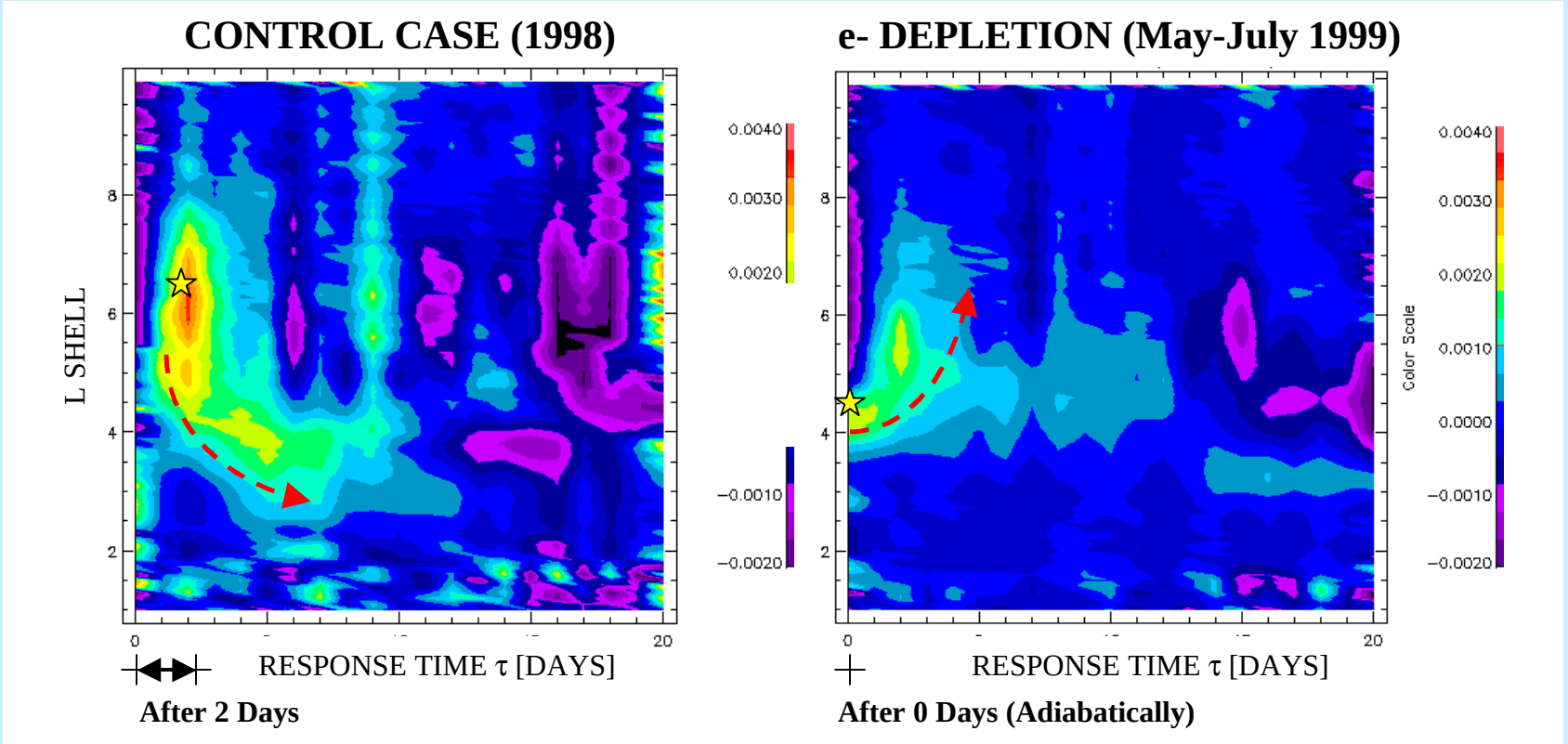
Energetic (MeV) Electron Response H(L;τ) to Solar Wind Speed



☆ : Earliest significant response peak

- - ▶ : Direction of peak's motion